SCREENING AND MANAGEMENT OF ANEMIA IN ADOLESCENT GIRLS IN LOWER SOCIOECONOMIC STRATA

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in partial fulfilment for the award of the Degree of

M.D. OBSTETRICS AND GYNAECOLOGY

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CHENNAI

MARCH - 2009

CERTIFICATE

This is to certify that the dissertation titled "**SCREENING AND MANAGEMENT OF ANEMIA IN ADOLESCENT GIRLS IN LOWER SOCIOECONOMIC STRATA"** is the bonafide work done by **Dr. S. BANUMATHY** between April 2007 to April 2008 during her M.D.,O.G., course at ISO -KGH, MMC Chennai.

DEAN	DIRECTOR
MADRAS MEDICAL COLLEGE	ISO-GOVT. KGH

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I thank **my family and friends** for their inspiration and support given to me.

I would like to thank God for everything.

ETHICAL COMMITTEE CERTIFICATE

No:

Dated:

I, **Dr.S. BANUMATHY** apply for the ethical committee certificate for the project **"SCREENING AND MANAGEMENT OF ANEMIA IN ADOLESCENT GIRLS IN LOWER SOCIO ECONOMIC STRATA"** under the guidance of **Dr. Prof. VASANTHA N. SUBBAIAH, Director, Institute of Social Obstetrics and Gynaecology in Govt K.G. Hospital, Chennai-600 005**

I understand the implications of doing research with human subjects and will fully comply with the regulations and keep the dignity and protect the health of subjects at all costs.

Signature of the Postgraduate Student

I have no objective to guiding this postgraduate student in the project mentioned above. I shall supervise to the extent that all the human rights are protected and research is carried on with utmost humanitarian principles

Signature of the Guide

Director of Social Obstetrics
Institute of Social Obstetrics and
Govt. Hospital for Women & Children
For women and children.
Triplicane, Chennai-600 005

Seal of Guide

I certify that this project has been presented in front of the Ethical Committee on duly formatted in this institution and that all the members of the ethical committee have given permission to conduct this research

CHAIRMAN ETHICAL COMMITTEE

Professor & Head
Dept. of Community Medicin
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Seal

Date:

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CONTENTS

INTRODUCTION

INTRODUCTION

Adolescence is a time of intense physical, psychosocial and cognitive development. Increased nutritional need at this junction relate to the fact that the adolescents gain upto 50 % of their adult weight, more than 20 % of their adult height and 50% of their adult skeletal mass during this period. The iron needs are high in adolescent girls because of the increased requirements for expansion of blood volume associated with the adolescent growth spurts and the onset of menstruation.[Clinical medicine and Research]

India has the highest prevalence of iron deficiency anemia among women in the world especially adolescent girls. 60-70% of Indian adolescent girls are anemic [International centre for research on women and the Institute of health management- pachod]

The percentage of Indian adolescent girls who were anemic was reported as 73.7% by Chaturvedi et al, 61.9% in urban areas and 85.4% in rural areas.

In adolescent girls, anemia can lead to reduced work productivity, impaired physical capabilities, if they conceive can result in adverse pregnancy outcomes and severe anemia can lead to maternal death.

Global interest in adolescent health issues has grown dramatically in the past decade beginning with the international year of youth in 1985 and the world health assembly in 1989,when discussions were focused on the health of youth[Indian Journal Of Community Medicine-2006]

Adolescent girls constitute a vulnerable group particularly in developing countries where they are traditionally married at an early age and exposed to a greater risk of reproductive morbidity and mortality.Adolescence represents a real oppurtunity to make a difference in life long patterns.

Adolescence as a period of growth and development is considered the best time to intervine ,to assist in physical and mental development and to prevent later maternal anemia through schools programmes, recreational activities and mass media.

A significant percentage of adolescents in the developing world are anemic, causing considerable health consequences for this age group. About 27% of adolescents are estimated to be anemic in developing

countries, compared to 6% in developed countries.

Regional figures although varying by country, within the region suggest the following prevalence rates for anemia. In Africa -45%, In Oceania 45%, Latin America-12% and in Russia 19% of the adolescent girls are anemic.

In studies conducted by the International centre for research on women, they reported higher rates of anemia in Nepal-42%,India-55% and Cameroon-32%. In 1997 survey of 12-18 years old girls in rural India found an anemia prevalence rate of 82.9% among girls in school and 92.7% among girls not in school.[Senderowitz- 1998]

Prevalence of anemia among adolescent girls of rural Tamilnadu-44.8% the existing prevalence studies were carried out mostly in northern states of India and the only study in Tamilnadu was among affluent girls of Coimbatore. This study has demonstrated that anemia among rural girls of Tamilnadu is also high as in other parts of the country..[Rajarathnam et al].

Adolescents receive little health and nutrition attention. Programme addressing adolescent nutrition in South-East regions are very few , small and experimental. They are mainly aimed at the

prevention, and control of anemia among adolescents.Some of the programmes targetted at adolescents in India are

Adolescencts Girls Scheme (AGS) or “Kishori shakti yojana” is part of the Integrated Child Development Services Scheme (ICDS), devised during 1991-1992, for adolescent girls in the age group of 11-18 years .The scheme fills the gap in services for adolescents . The main objectives of the scheme is to improve the nutrition and health status of girls in the age group of 11-18 years.[Adolescent nutrition ; A Review of the situation in South East Asian Countries].

UNICEF Adolescent anemia project – has initiated a project in 11 Indian states to provide IFA supplementation in adolescent girls in order to reduce levels of anemia prior to their initiating childbearing. Implemented through schools with support of health centres in certain areas and in others as a part of Kishori Shakti Yojana. Evaluation have shown high rates of compliance and significant improvement in Hb levels. [Kotecha et al]. This model of IFA supplementation is now being adopted in National ICDS Programme .[Adolescent nutrition ; A Review of the situation in South East Asian Countries].

REVIEW OF LITERATURE

HISTORICAL ASPECTS OF ANEMIA

The work of Hedin and wintrobe in assessing the volume of packed red cells by various types of hematocrit and the work of Keith and Garathy in estimating blood volume lead to the accurate laboratory definition of the presence or absence of anemia.

Pierre Blaud in 1832, discovered that ferrous sulfate tablets were effective therapy for iron deficiency anemia.

In 1922 Price quantitated the variation in red cell size seen in various types of anemia.

In 1932, Wintrobe deviced the concept of red cell indices.

Adolescent girls are a particularly vulnerable group as their requirements of iron as well as its losses from the body are high. Anemia during adolescence limits growth and delays the onset of menarche. Very often, in India, girls get married and become pregnant even before the growth period is over, making anemia doubly risky. Only few programmes for anemia control have targeted adolescent girls and health care of adolescent girls all over the world has not been given priority. since the anemic status of these adolescent girls is bound to affect their offspring, care during this period is likely to pay rich divedends [Shoba et al] .The prevalence of anemia is disproportionately high in developing countries due to poverty, inadequate diet, certain diseases, pregnancy and lactation and poor access to health services. Young people are particularly susceptible because of their rapid growth and associated high iron requirements [Senderowitz-1998]

DEFINITION OF ANEMIA

The function of red cells is the transport of oxygen to tissues. In physiologic term, therefore, anemia may be defined as a reduction in the oxygen transport capacity of the blood , which is due to deficiency of red cells.

Anemia may be defined as a reduction below normal limits of the total circulating red cell mass. This value is not easily measured. Therefore anemia has been defined as a reduction below normal in the volume of packed red cells, as measured by hematocrit or a reduction in the hemoglobin concentration of the blood [Robbins]

DEGREES OF ANEMIA

WHO STANDARD

Normal	-	more than 12g/dl
Mild	-	10-11.99g/dl
Moderate	-	8-9.9g/dl
Severe	-	less than 8g/dl

According to DESHMUKH[2006]

Mild	-	9.1-11g/dl
Moderate	-	7.1-9g/dl
Severe	-	less than 7g/dl

According to DARWIN;

Mild	-	9.1-10g/dl
Moderate	-	5.1-9g/dl
Severe	-	less than 5g/dl

In this study WHO standards are being used.

CAUSES OF ANEMIA;

- Dietary lack -In developing countries where food is less abundant and diets are predominantly vegetarian, containing poorly absorbable inorganic iron, leads to iron deficiency anemia.
- Faulty dietetic habit- rich in carbohydrate, presence of phosphates and phytates impairs absorption.
- Social factor-The girls are accorded a lower place in the family when compared to the male children. They are thus deprived of even adequate food.
- Increased requirement-in infants, children, adolescents, pregnancy.
- Hookworm infestation-[0.05ml/worm/day] loss of 0.5 to 2mg/day
- Chronic blood loss - menorrhagia in adolescent girls

  -chronic malaria

  -bleeding piles/dysentry

SOURCES OF IRON

There are two forms of iron , haem -iron and non-haem iron.

Foods rich in haem iron are liver , meat , poultry and fish.

Bioavailability of haem iron is good and it promotes absorption of non haem iron.

Foods containing non-haem iron are those of vegetable origin e.g., cereals, green leafy vegetables , legumes , nuts , oilseeds , jaggery and dried fruits .

DAILY IRON REQUIREMENTS IN DIFFERENT AGE GROUP

Infants [5-12 months]	-	0.7mg/day
Children [1-12yrs]	-	1mg/day
Adolescents [13-19yrs]	-	2.4mg in girls, 1.8mg/day in boys
Adult males	-	0.9 mg/day
Adult females;		
Menstruating	-	2.8mg/day
Pregnancy - first half	-	0.8mg/day
- Second half	-	3.5mg/day
Lactation	-	2.4mg/day
Postmenopausal	-	0.7mg/day

IRON LOSS;

During menstruation	-	0.5-1mg/day on an average
Sweat loss	-	15mg/month
Daily loss	-	0.5-1mg/day normally

PATHOPHYSIOLOGY AND STAGES OF IRON DEFICIENCY ANEMIA;[PARK]

Increased requirement/ inadequate intake/ reduced absorption/chronic bleeding

↓

Increased iron absorption from intestine

↓

Mobilisation of iron stores

↓

Decreased iron stores

[STAGE-1; decreased sr.ferritin, without any other detectable abnormalities]

↓

Iron stores are depleted

[STAGE-2, serum ferritin fallsand transferrin saturation decreases (less than 15%)

latent iron deficiency, anemia has not occurred yet, prevalent in India]

↓

Decreased supply of iron to erythroid precursors

↓

Accumulation of free erythrocyte protoporphyrins

↓

Reduced erythrocyte indices

[STAGE-3, decreased Hb,MCV,MCH,MCHC ,overt iron deficiency, peripheral smear shows microcytic hypochromia, anisocytosis, poikilocytosis]

SEQUENTIAL PHASE OF IRON DEFICIENCY

1. Decrease in storage iron leads to

- Decreased tissue iron
- Decreased marrow iron
- Decreased serum ferritin
- Decreased serum transferrin

2. Decrease in iron for erythropoises leads to

Decreased MCV,MCH, transferrin saturation and erythrocyte protoporphyrin

3.Decrease in peripheral blood Hb leads to

Decreased Hb and hematocrit.

4.Decrease in tissue oxygen delivery leads to

Manifestations of clinical signs and symptoms

SYMPTOMS;

Fatigue, Weakness, Feeling of exhaustion, Lassitude,

Behavioral and intellectual changes,

Palpitation, dyspnoea, giddiness and swelling of legs in severe anemia.

SIGNS;

Pallor of varying degrees,

Evidences of glossitis and stomatitis,

Edema legs,

Soft systolic murmur,

Basal crepitations if in failure

KUPPUSWAMY'S SOCIOECONOMIC STATUS SCALE.

A) EDUCATION	**SCORE**
Professional or honours	7
Graduate or postgraduate	6
Post high school diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate	2
Illiterate	1

B) OCCUPATION	**SCORE**
Profession	10
Semi-profession	6
Clerical, shop owner, farmer	5
Skilled worker	4

Semi-skilled worker	3
Unskilled worker	2
Unemployed	1

C) FAMILY INCOME Per month in Rs.	**SCORE**
More than 2000	12
1000-1999	10
750-999	6
500-749	4
300-499	3
101-299	2
less than 100	1

TOTAL SCORE	**SOCIOECONOMIC CLASS**
26-29	UPPER[1]
16-25	UPPER MIDDLE[2]
11-15	LOWER MIDDLE[3]
5-10	UPPER LOWER[4]
Less than 5	LOWER[5]

Based on this score the adolescent girls were grouped under class 4 and class 5.

The Institute Of Health Maanagement-Pachod[IHMP] In Collaboration with ICRW has conducted a 3 year community intervention study in Maharashtra to improve dietary behaviour and reduce iron deficiency anemia among adolescent girls aged 10-19yrs with iron and folic acid supplementation and dietary counseling. The study result show that there was a significant increase in the percent of girls who eat more than 3 meals a day and eat lemon with meals as well as in the frequency of eating fruits. Regarding the effect on anemia there is significant improvement in baseline Hb level from 5.8 to 9.5g/dl for severely anemic girls and from 8.9 to 11.2g/dl for moderately anemic girls.

Senderowitz 1998- In a survey of adolescent girls in rural India, more than one half of the respondents did not know that diet is related to anemia and less than 5% mentioned excessive menstrual bleeding as a cause of anemia. Furthermore 29% of the school girls and 43% of the out of school girls had no kknowledge of anemia's adverse effects.

In The International Centre for Research On Womem Guatemala metabolic study, researchers found that Hb levels increased during iron supplementation but fall when a placebo was taken.this confirms the

findings that while supplementation can rapidly improve iron status ,continued interventions are necessary to maintain this improved iron status.

A Mothercare supported study in India using a nutrition communication strategy to improve dietary intake and reduce anemia and undernutrition in early adolescent school girls was implemented over six months.A one year post intervention evaluation showed significant increase in growth velocity ,mean Hb levels ,anemia related knowledge and dietary behaviour in the experimental, compared to control group . In Peru a study supported by mothercare comparing daily and intermittent supplementation in a group of adolescent girls showed that the prevalence of anemia significantly decreased with daily supplements , there was no decrease among those received the intermittent dosage 2 days/week.

In an U S clinical trial assessing the effects of iron deficiency on cognitive funtion ,iron supplemented adolescent girls performed better on a test of verbal learning memory than the control group .

A Hellen keller International project in Indonesia begun in 1996 assessed the impact of various strategies to improve the iron status in adolescent girls. Three independent intervention was choosen – iron supplementation, a dietary approach and education .School setting was selected as appropriate channel for addressing adolescent nutritional problem.

Yustina anie Indriastuti Kurniawan and Siti Muslimatin carried out a double blind community trial in 133 anemic adolescent girls 11-19 yrs old to investigate whether iron-zinc supplementation would improve iron and zinc status. it was concluded that iron supplementation alone improved iron and zinc status effectively, while adding zinc protected the adversee effect of iron on decreasing zinc absorption. The increment of Hb concentration among adolescent girls who took iron alone was the highest and significantly higher compared to those who took iron/ zinc supplements.

Sharadha et al conducted a study to asses the efficacy of twice weekly iron supplementation in anemic adolescent girls. 254 girls with different hemoglobin levels were selected, of which 41 were not anemic . The rest were graded as mild,moderate, or severely anemic and

supplemented with iron and folic acid tablet daily in one group and twice weekly in another group for 12 weeks. There was no significant difference in the increase in Hb levels betwwen daily and twice weekly supplemented adolescent girls at the end of the study.

Indian Journal Of Community Medicine -2006 To study the epidemiological correlates of nutritional anemia among adolescent girls in rural wardha , a cross sectional study was carried out in adolesent girls of 4 villages of Kasthurba rural health training center – Anji . 630 adolescent girls in the age group 13 to 19 years in the study area were covered. A pretested and predesigned proforma was used to collect the information on socio -demografic characteristics like age , educational status , family sides, monthly family income , medical history like age at menarche ,history of worm infestation ,excessive menstrual bleeding in the past 3 months and dietary history .Height ,weight and Hb was recorded. Hb esstimation was done using cyanmethhemoglobin method . For interpretation of anemia cut off point for Hb level taken was < 12 g/dl . The severity of anemia was graded as mild(10 -12 g/dl), moderate (7 -10 g/dl) and severe (< 7 g/dl). univariate and multivariate analysis was carried out . ……

In the study the prevalence of anemia was found to be 59.8% . The prevalence of severe, moderate and mild anemia was 0.6% ,20.8%,38.4% respectively. Girls with socioeconomic status grade 5 were associated with incresed likelihood of anemia compared to girls with grade1. Those with iron in tak 14 -20 mg were two times more likely to have anemia than girls with more than 20 mg iron in take,while those with <14 mg were 5 times more likely to have anemia. Strongest predictor to anemia was history of excessive menstrual bleeding and vegetarian diet followed by history of worm infestation. Age, education ,BMI and status of menarche did not show any significant association with anemia .

Community level intervention to prevent and treat anemia .

Evidence review series -2008- nine community level anemia intervention program were selected for the review out of which 6 focussed on anemia among adolescent girls, 2 on fortification ,1 on maternal anemia .All the interventions were community based with most working in rural areas.

Overview of interventions

1) Improving Nutrition In Adolescent Girls– implemented in two districts of Uttar pradesh . In school and out of sechool adolescent girls used a girl to girl approach of peer education to reach beyond those girls in school

2) Reducing iron deficiency anemia and changing dietary behaviour among adolescent girls- changing dietary behaviour ,weekly IFA tablets for first three months implemented in 16 slums in pune and expanded to 72 villages of maharastra(2000-2003).

3) Adolescent girls anemia control program – weekly IFA supplementation and improved dietary practices implemented in Vadodara district -Gujarat(2000 on going).

4) Identification of an appropriate strategy to control anemia in adolescent girls of poor communities - tested with once a week versus daily supplementation of IFA among adolescent girls implemented in urban areas of Delhi and rural areas of Bharatpur, Rajasthan (2002).

5) Anemia prevention project - package of services , focus on maternal and adolescent anemia. Implemented in Gumla district , Jharkand(2004-2006)

6) Anemia control program for adolescent school girls -weekly supplementation of IFA , among adolescent girls . Implemented across Jharkand (2000 on going).

Hellen keller et al 2005- school based iron and folic acid supplementation for adolescent girls – Manica Province – Mozambique. A recent survey also shows that 45% of girls 10 – 18 years old attending school are anemic. To assess the programme effectiveness of two school based weekly iron and folic acid supplementation regimes(5 months supplementation versus 8 months) in girls 10 – 18 years old attending school in Manica province. Tab. Mebendazole 500 mg given twice , once at beginning of the study , another at 6 months . IFA given weekly for 3 months in 8 months regime group but not in 5 months regime group . Between 3 rd and 8 th month , all girls in both groups received weekly IFA supplements . Results:- Initially mean Hb concentration and anemia prevalence were comparable in both groups .At third month the mean Hb concentration in 8 months regime groups was significantly higher and

prevalence of anemia was lower than in the 5 month regime group . But at the end of 8 months when both the groups had received IFA tablets, there was no significant difference in the Hb level or in the prevalence rates.

Revaleta et al – in a double-blind placebo-controlled study to assess the efficiency and acceptability of a daily and intermittent iron supplementation trial conducted at Peru, concluded that post intervention Hb and serum ferritin improved significantly in the iron supplemented groups compared to placebo. Daily supplementation led to higher Hb increase than intermittent supplementation.

Kanani et al – combatting anemia in adolescent girls in India.

In a study on anemia in adolescent girls living in slum areas in Gujarat,105 girls aged 10 – 18 years were selected from same ethnic and geographic area. Most of the girls were unaware of the term anemia .The girls described symptoms associated with anemia and knew these could be remedied with green leafy vegetables , fruits , milk , meat, tonics from the doctor and iron tablets . Causes of anemia , symptoms , treatment and prevention were covered by a puppet show using local

terms and events . Girls were encouraged to have their blood tested and to take iron tablets. Results from the last hemoglobin levels showed a significant increase.

Prevalence reduced from 98 % - 87 %. There was a significant increase in awareness of anemia, importance of diet in preventing anemia, role of menstruation in increasing iron needs and contribution to anemia .

Sharma et al – identification of an appropriate strategy to control anemia in adolescent girls of poor communities. Adolescent girls of poor communities in rural parts of Bharathpur (Rajasthan)were included in the study and their Hb levels were taken. The Hb levels of the adolescent girls were measured again after 3 months and 6 months of iron supplementation in two groups that is daily and weekly once supplementation. The response of Hb levels to daily IFA supplementation was better in comparison to once weekly supplementation.

Jackson et al – conducted a randomized, double blind, placebo controlled trail in anemic adolescent girls in rural Bangladesh. Participants' Hb checked and supplemented with IFA tablets and Hb

rechecked. There was a significantly greater increase in Hb in IFA supplemented groups than placebo groups.

Adolescent Girls Anemia Control Programme – conducted in Vadodara district, Gujarat. Project established in 405 schools, 65000 girls 12-19 years were enrolled in the study. Prevalence of anemia was 74.7%. The schools ensured IFA supplementation and nutrition session on fixed day, weekly basis. The education session drew on an array of multimedia IEC materials specially prepared for the project. Only transient side effects were reported. A midterm impact assessment showed that the prevalence of anemia Hb level (less than 12g/dl) declined from 74.7% at baseline to 54.2%. There were improvement in all categories of anemia.

AIM OF THE STUDY

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1) To assess the Hb status of adolescent girls from lower socio economic strata of society.

2) To identify the attributable causes of anemia in these adolescent girls.

3) To counsel on the impact of anemia and to educate them and the importance of regular iron intake.

4) To appropriately treat anemia in whom it was deducted.

5) To reassess the Hb status at three months interval for 1 year.

6) To encourage the regular intake of iron.

7) To popularise adolescent girls about consuming locally available, economically affordable iron rich foods

MATERIALS AND METHODS

MATERIALS AND METHODS

PLACE OF STUDY

The study was conducted at Institute Of Social Obstetrics and Govt. Kasthurba Gandhi Hospital (ISO and Govt.KGH), Triplicane, Chennai, Outpatient Department.

PERIOD OF STUDY

From April 2007 to April 2008

STUDY POPULATION

500 Adolescent girls between 12-19 years of age belonging to lower socioeconomic strata were included in the study based on the inclusion and exclusion criteria.

INCLUSION CRITERIA

1. Age between 12 and 19 years of age.
2. Belonging to lower socioeconomic strata.
3. No known hematological lesion.
4. Not pregnant at the time of intervention.
5. Not on IFA Supplementation.

EXCLUSION CRITERIA

1. Girls <12yrs and >19yeras of age.
2. Pregnant woman.
3. H/o bleeding tendency.
4. On long time medications which might produce hematological complications.
5. H/o menstrual disturbances.
6. H/o malarial fever in the recent past
7. Not willing to consume IFA tablets.
8. Not sure about follow up visits.
9. Not willing for changing food habits.

CRITERIA FOR ANEMIA;

DEGREES OF ANEMIA;

Normal	-	>12g/dl
Mild	-	10-11.9g/dl
Moderate	-	8-9.9g/dl
Severe	-	<8g/dl

INVESTIGATIONS DONE;

1) Hemoglobin analysis by Sahli's hemoglobinmeter followed by calorimetric assessment where Hb level is low.

2) Stool examination

DESIGN OF STUDY

Prospective analytical study

METHOD OF STUDY

Adolescent girls between 12-19 years of age belonging to lower socioeconomic status fulfilling the inclusion and exclusion criteria were included in the study after getting their and their parents' consent. Most of these girls come accompanying their mother or other relatives who attend the various op departments at ISO and KGH .

All the girls included in this study, had attained menarche , with regular menstrual history (changing 2- 3 pads / day), no H/o passing clots.

All consume mixed diet but infrequently because of poor socioeconomic status.

A pin prick blood sample was obtained from each girl . Hb level checked with sahli's hemoglobinometer and those girls found to be anemic were further tested with calorimeter. Based on their Hb levels, they were classified under various degrees of anemia. Stool examination was done for all anemic girls .These girls were dewormed with a single dose of Tab.Albendazole400mg.Anemic girls were supplemented with iron and folic acid tablets which contain 100mg of elemental iron and 500microgram of folic acid, available under Adolescent anemia prevention programme. They were instructed to take the tablet half an hour before lunch, since acidity increases iron absorption and clearly explained about the method of taking the tablet and also the importance of consuming the tablet without fail. The period of supplementation was one year. Complaince was good. Only few girls complained of transient side effects like nausea, vomiting, abdominal pain which was not debilitating.

Blood samples were obtained from each girl by pin prick method at the end of third, sixth, ninth month and one year. No squeezing or compression was employed and free flowing blood was collected from the punctured finger tip. Hb was then estimated. Group means and

standard deviations were calculated and student 't' test and paired 't' test were carried out to test the significance of difference between means of values of different groups as well as with in the group at different periods of supplementation.

To assess the knowledge about anemia among these adolescent girls, ten questions were prepared as follows

1) What is anemia?
2) What are the causes of anemia?
3) Knowledge about iron rich foods ?
4) How to prevent anemia?
5) Anemia in menstruating women?
6) Importance of consuming iron rich foods in menstruating women?
7) Regarding iron and folic acid tablets?
8) Impact of adolescent anemia during pregnancy?
9) Regarding signs and symptoms?
10) Anemia due to hook worm infestation?

Among these questions first three were selected based on the statistical weightage in this study. The initial knowledge about these questions were enquired in local terms and recorded initially , but the

importance of all ten questions were explained to them clearly. At the end of three months the improvement in knowledge regarding the first three questions were recorded.

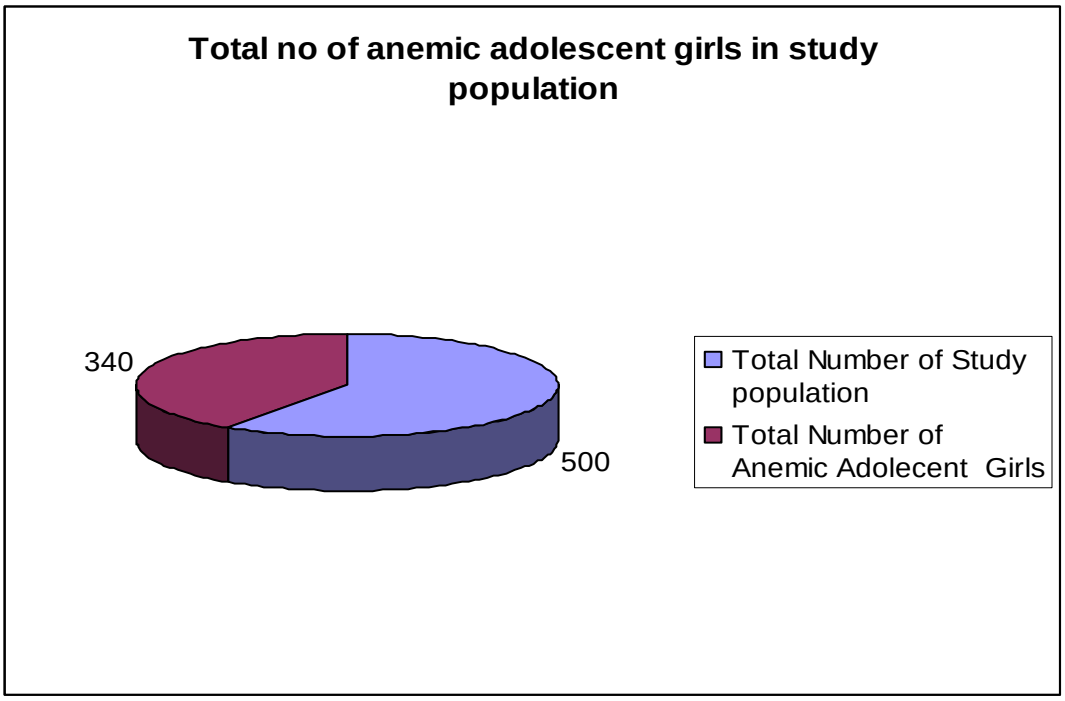
Those who answered initially for the questions defined paleness, tiredness, weakness as anemia, inadequate diet and increased demand as the cause of anemia, green leafy vegetables, fruits and non vegetarian food as iron rich foods for the first three questions respectively.

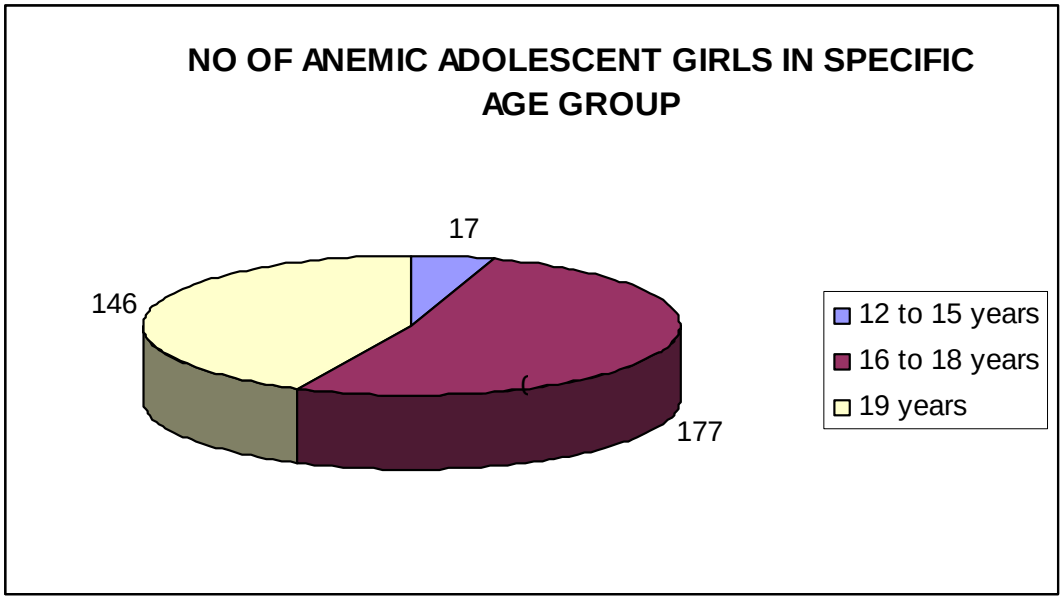
RESULTS

TABLE-1

TOTAL NO OF ANEMIC ADOLESCENT GIRLS IN STUDY POPULATION

AGE GROUP (Yrs.)	TOTAL NO OF ADOLESCENT GIRLS IN SPECIFIC AGE GROUP	NO OF ANEMIC ADOLESCENT GIRLS IN SPECIFIC AGE GROUP
12-15	86 (17.2%)	17 (5%)
16-18	224 (44.8%)	177 (52.1%)
19	190 (38%)	146 (42.9%)
TOTAL	**500**	**340 (68%)**


Total no of anemic adolescent girls in study population
340
500
Total Number of Study population
Total Number of Anemic Adolecent Girls


NO OF ANEMIC ADOLESCENT GIRLS IN SPECIFIC AGE GROUP
17
146
177
12 to 15 years
16 to 18 years
19 years

4 girls in the age group of 16-18 years did not turn up for further follow up

TABLE-2

TOTAL NO OF ANEMIC ADOLESCENT GIRLS UNDER SPECIFIC AGE GROUP, UNDER SPECIFIC DEGREE OF ANEMIA.

AGE GROUP (years)	INITIAL HB STATUS		
	MILD	MODERATE	SEVERE
12-15 (n=17)	17 (100%)	0	0
16-18 (n=173)	29 (16.8%)	132 (76.3%)	12 (6.9%)
19 (n=146)	6 (4.1%)	116 (79.5%)	24 (16.4%)
TOTAL	**52 (15.5%)**	**248 (73.8%)**	**36 (10.7%)**

Using CHI-SQUARE TEST, p VALUE - 0.000

There is significant difference in the existence of anemia in different age group. The prevalence and the severity of anemia increases as the age advances.

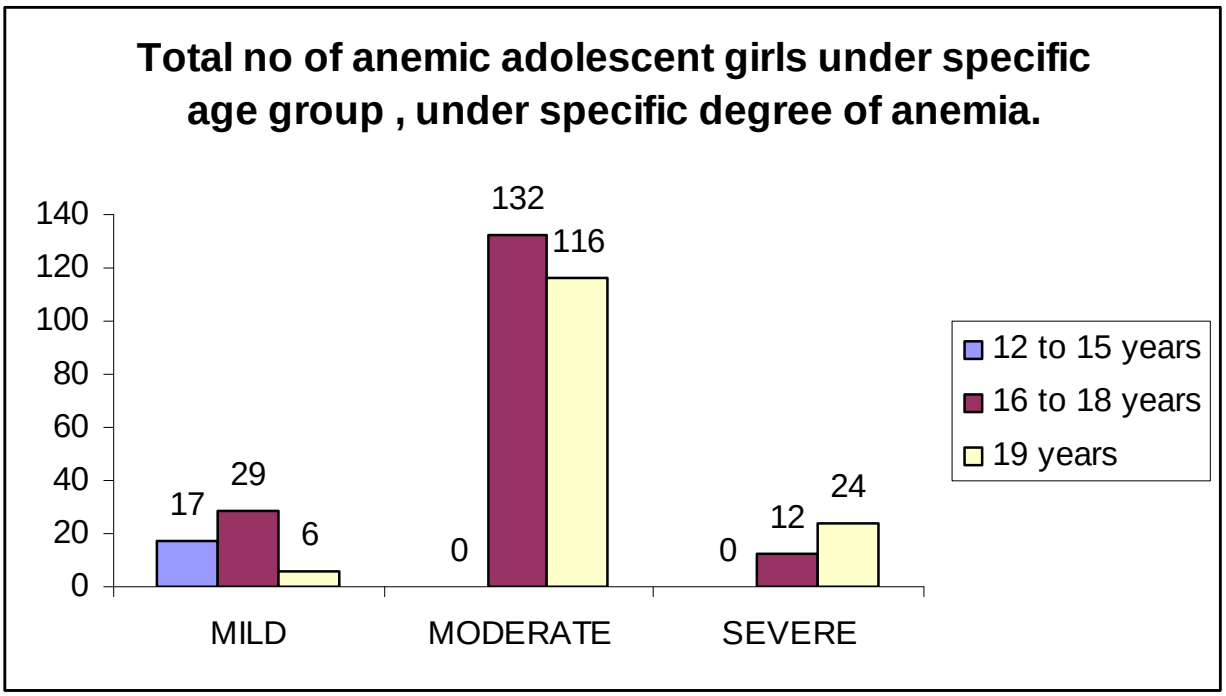

Total no of anemic adolescent girls under specific age group , under specific degree of anemia.
140
120
100
80
60
40
20
0
17
29
6
0
132
116
0
12
24
MILD
MODERATE
SEVERE
12 to 15 years
16 to 18 years
19 years

TABLE-3

SOCIOECONOMIC STATUS AND ANEMIA

SOCIOECONOMIC STATUS	INITIAL HB STATUS		
	MILD	**MODERATE**	**SEVERE**
4 (n=18)	52 (44.1%)	66 (55.9%)	0
5 (n=218)	0	182 (83.5%)	36 (16.5%)
TOTAL (n=336)	**52 (15.5%)**	**248 (73.8%)**	**36 (10.7%)**

Using CHI- SQUARE test P Value - 0.000

The difference between the two groups is statistically significant

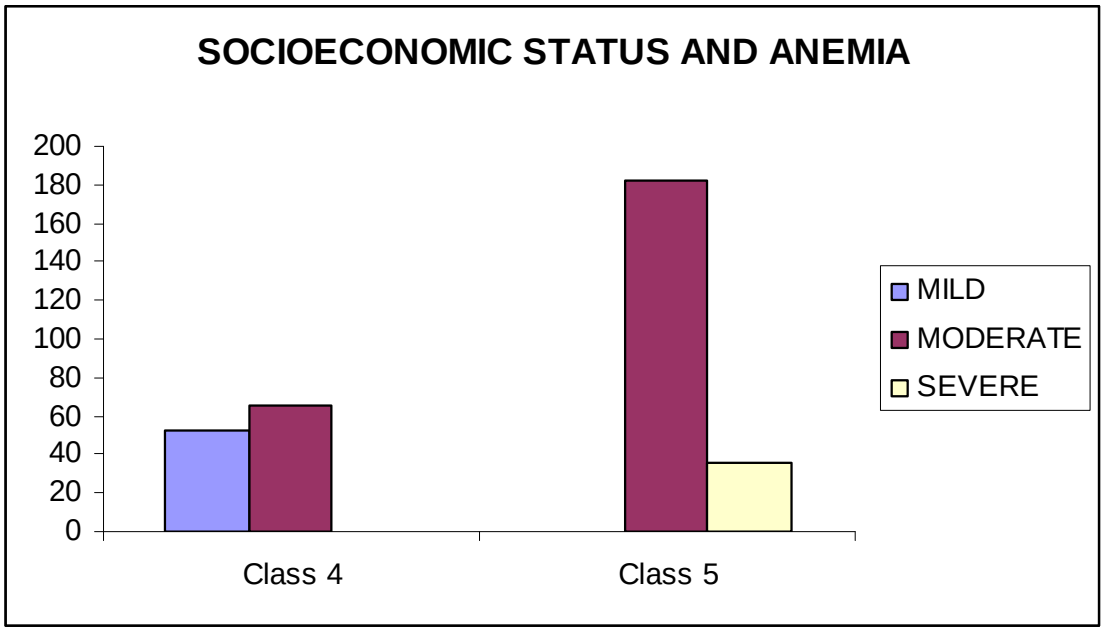

SOCIOECONOMIC STATUS AND ANEMIA
200
180
160
140
120
100
80
60
40
20
0
Class 4
Class 5
MILD
MODERATE
SEVERE

TABLE – 4

HOOKWORM INFESTATION AND ANEMIA

HOOKWORM INFESTATION	**INITIAL HB STATUS**		
	MILD	**MODERATE**	**SEVERE**
ABSENT (n=62)	52 (83.9%)	10 (16.1%)	0
PRESENT (n=274)	0	238 (86.9%)	36 (13.1%)
TOTAL (n=336)	**52 (15.5%)**	**248 (73.8%)**	**36 (10.7%)**

Using CHI -SQUARE test P Value – 0.000

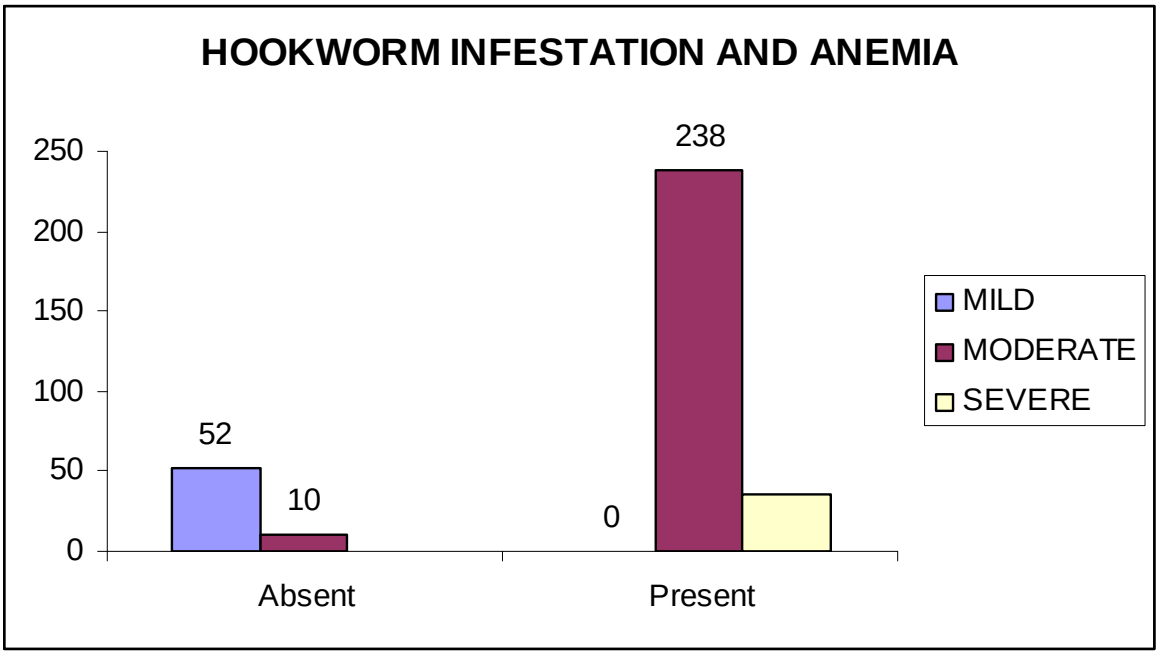

HOOKWORM INFESTATION AND ANEMIA
250
200
150
100
50
0
52
10
0
238
Absent
Present
MILD
MODERATE
SEVERE

TABLE -5

NO OF ADOLESCENTS IMPROVED IN THEIR HB STATUS

AFTER 3 MONTHS OF THERAPY

INITIAL HB DEGREE	**HB STATUS AT 3 MONTHS**		
	NORMAL	**MILD**	**MODERATE**
MILD (n=52)	47 (90.4%)	5 (9.6%)	0
MODERATE (n=248)	146 (58.9%)	96 (38.7%)	6 (2.4%)
SEVERE (n=36)	0	7 (19.4%)	29 (80.6%)
TOTAL (n=336)	**193 (57.4%)**	**108 (32.1%)**	**35 (10.4%)**

TABLE-6

NO OF ANEMIC ADOLESCENTS IMPROVED IN HB STATUS

AFTER 6 MONTHS OF THERAPY

INITIAL Hb DEGREE	**HB STATUS AT 6 MONTHS**		
	NORMAL	**MILD**	**MODERATE**
MILD (n=5)	5 (100%)	0	0
MODERATE (n=98)	57 (58.2%)	35 (35.7%)	6 (6.1%)
SEVERE (n=36)	7 (19.4%)	10 (27.8%)	19 (52.8%)
TOTAL (n=139)	**69 (49.6%)**	**45 (32.4%)**	**25 (18.0%)**

TABLE – 7

NO OF ADOLESCENT GIRLS, IMPROVEMENT OF HB STATUS AFTER 9 MONTHS OF THERAPY

INITIAL HB DEGREE	HB STATUS AT 9 MONTHS	
	NORMAL	**MILD**
MODERATE (n=35)	35 (100%)	0
SEVERE (n=28)	10 (35.7%)	18 (64.3%)
TOTAL (n=63)	**45 (71.4%)**	**18 (28.6%)**

TABLE -8

NO OF ADOLESCENTS AND IMPROVEMENT IN THEIR HB STATUS AFTER 1 YEAR OF THERAPY

INITIAL HB STATUS	HB STATUS AT 1 YEAR
	NORMAL
SEVERE (n=16)	16

TABLE-9

CHANGES IN HEMOGLOBIN OF ANEMIC GIRLS DURING SUPPLEMENTATION

DEGREE OF ANEMIA	MEAN HEMOGLOBIN g/dl ON				
	INITIAL	3 MONTHS	6 MONTHS	9 MONTHS	1 YAER
MILD (n=52)	10.25 ±0.15	11.75 ±0.45	12.29 ±0.09	12.48 ±0.08	12.67 ±0.17
MODERATE (n=248)	9.0 ±0.10	10.81 ±1.4	11.15 ±1.25	12.35 ±0.25	12.60 ±0.20
SEVERE (n=36)	7.70 ±0.2	9.70 ±1.2	11.40 ±1.6	12.05 ±1.05	12.80 ±0.4

Using paired 't' test p value -0.000. improvement in Hb level is significant.

TABLE -10

KAP -WHAT IS ANEMIA

PRECOUNSELING	POST-COUNSELING	
	YES	**NO**
YES	36 (100%)	0
NO	265 (88.3%)	35 (11.7%)
TOTAL	**301 (89.6%)**	**35 (10.4%)**

Using paired T test P Value -0.000

The difference between pre and post counseling knowledge is significant

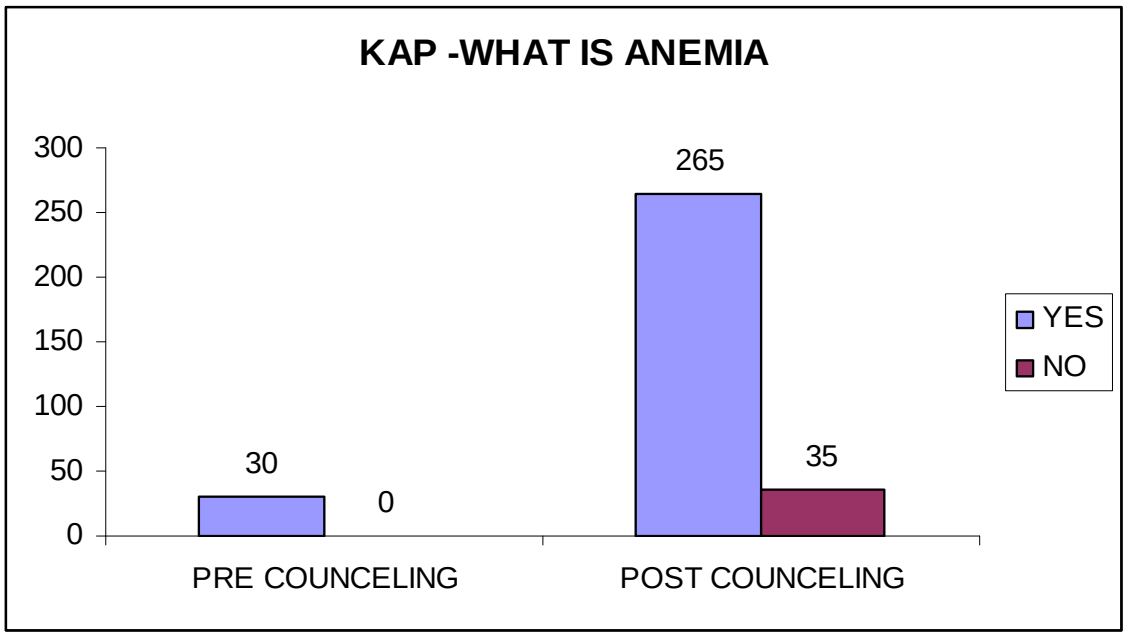

KAP -WHAT IS ANEMIA
300
250
200
150
100
50
0
30
0
265
35
PRE COUNCELING
POST COUNCELING
YES
NO

TABLE -11

KAP-CAUSES OF ANEMIA

PRE-COUNSELING	**POST-COUNSELING**	
	YES	**NO**
YES (n=31)	31 (100%)	0
NO (n=305)	268 (87.9%)	37 (12.1%)
TOTAL **(n=336)**	**299** **(89.0%)**	**37** **(11.0%)**

Using paired t test p value -0.000

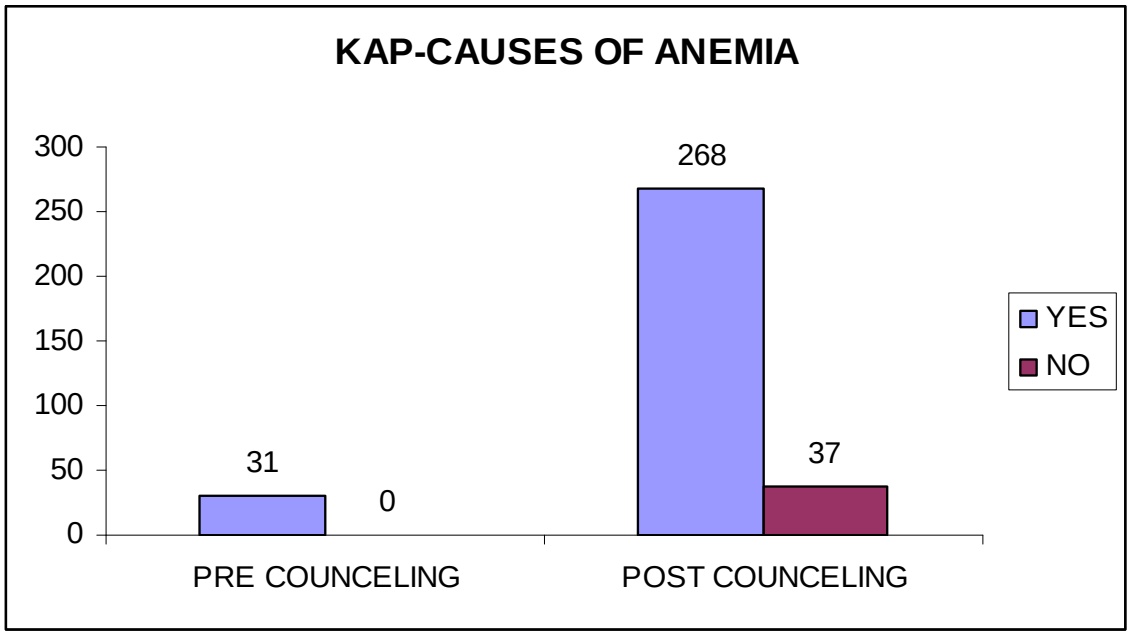
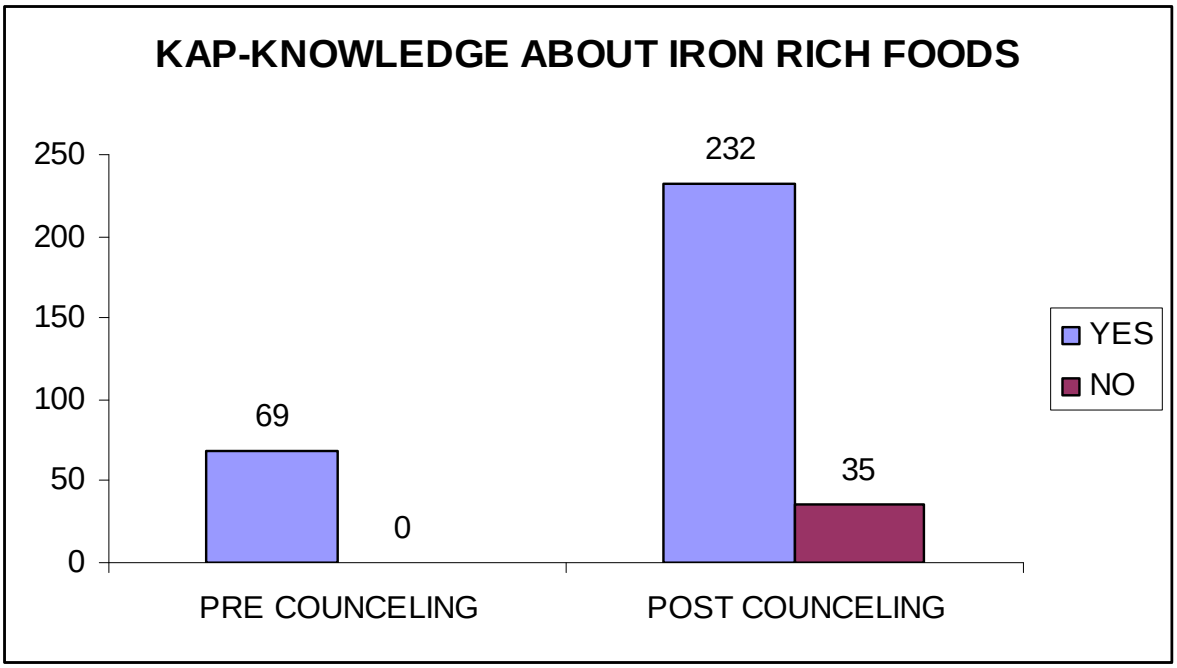

KAP-CAUSES OF ANEMIA
300
250
200
150
100
50
0
31
0
268
37
PRE COUNCELING
POST COUNCELING
YES
NO

TABLE -12

KAP-KNOWLEDGE ABOUT IRON RICH FOODS

PRECOUNSELING	**POST-COUNSELING**	
	YES	**NO**
YES (n=69)	69 (100%)	0
NO (n=267)	232 (86.9%)	35 (13.1%)
TOTAL **(n=336)**	**301** **(89.6%)**	**35** **(13.1%)**

Using paired t test p value – 0.000


KAP-KNOWLEDGE ABOUT IRON RICH FOODS
250
200
150
100
50
0
69
0
232
35
PRE COUNCELING
POST COUNCELING
YES
NO

DISCUSSION

There were 500 adolescent girls in the study population of whom 340 were anemic (68%), while the remaining 160 were not anemic(32%)[Table-1]

- Deshmukh et al reported the prevalence of anemia as 59.8%
- Rana et al and Seshadri et al reported a similar prevalence of 60% and 63% respectively.
- chaturvedi et al ,kotecha et al and Agarwal reported a prevalence of 73.7%, 74.7% and 47.6% respectively.

These differences in the prevalence of anemia may be due to difference in the study area. WHO/UNICEF has suggested that the problem of anemia is of very high magnitude in a community when prevalence exceeds 40%.

In this study the percentage of girls with moderate anemia is high.

Table – 2 shows that % moderate anemia is more than mild and severe anemia

DEGREE OF ANEMIA	Rajarathnam et al	Deshmukh et al	In this study
MILD	36.5%	38.4%	15.5%
MODERATE	6.3%	20.8%	73.8%
SEVERE	2.1%	0.6%	10.7%

Deshmukh et al has told in his study the prevalence of mild and moderate anemia demands immediate intervention before these girls enter into severe degree and bring down the total prevalence of anemia in adolescent girls.

In this study ,table – 2 shows that there is increase in the prevalence and severity of anemia as the age advances in adolescent girls , which is statistically significant .pvalue-0.000.

In this study, table- 3 shows that there is difference in existence of anemia between grade 4 and grade 5 socioeconomic status , which is statistically significant, p value-0.000 .

In a study conducted by Gawarika et al the prevalence of severe anemia was highest (17.3%) among adolescent girls of weaker class ($p<0.05$).

In weaker economic group the prevalence of severe anemia among girls above 14 years was 13.4% and below 14 years was 4.23%.

There is significant association between the prevalence of anemia and age of the adolescent girls and prevalence of anemia and lower socioeconomic status.

Low dietary iron , poor bio-availability , increased demand , combined with continued blood loss with each menstrual cycle may be the cause of higher prevalence in the later adolescent age group .

In this study , Table – 4 shows that there is difference in existence of anemia between anemic girls with hookworm infestation and without, which is statistically significant. p value-0.000.Girls with hookworm infestation were under moderate and severe degrees of anemia.

- Deshmukh et al in his study found hookworm infestation as a strong predictor of anemia.(OR=4.11 , Cl=1.70-9.93).
- Stoltzfus et al found that 25% of all anemia , 35% of iron deficiency anemia and 73% of severe anemia was attributable to hookworm infestation.

After supplementation with iron and folic acid , improvement in mean Hb level at 3 months interval for 1 year is discussed below. The hemoglobin level increased steadily as the period of supplementation increased.

Table – 5 shows that at the end of 3 months totally 193 adolescents reached normal Hb level. 47 girls from mild degree and 146 from moderate degree. Severely anemic girls had an improvement of mean Hb level from 7.46g/dl to 8.96g/dl.

Remaining 143 adolescents entered in to the period of next 3 months.

At the end of 6 months, table – 6 shows, 4 adolescents not turned up for follow up. In the remaining 139 adolescents , 69 girls reached normal Hb level. among 69 girls ,5 from mild degree ,57 from moderate

degree, 7 from severe anemia. 7 girls did not show significant improvement in the Hb level, hence they were excluded from the study and subjected to further investigations. Hence remaining 63 adolescents entered in to the period of next 3 months.

Table- 7 shows that at the of 9 months ,45 adolescents reached normal Hb level. 35 from moderate degree ,10 from severe degree.

At the end of 9 months , 17 adolescents entered in to the period of next 3 months.

Table – 8 shows that at the end of 1 year , 1 girl did not came for follow up. Remaining 16 girls reached normal Hb level.

Table-9 shows girls under all category had significant improvement from initial Hb level at the end of 3 months. Mildly anemic girls by the of 6 months, moderately anemic girls by the end of 9 months and severely anemic girls by the end of 1 year reached normal Hb level.

In a similar study conducted by Shoba et al , 203(83%) were found to be anemic , while the remaining 41 were not anemic. anemic girls were supplemented with daily iron and folic acid tablets and improvement in their Hb level studied.

- By the end of 3 months , all categories showed significant improvement from baseline Hb level.
- By the end of 9 months , mildly anemic adolescent girls reached normal level of Hb. At the end of 1 year study period all mild, moderate and severely anemic girls reached normal levels.

Severely anemic girls showed maximum overall improvement in mean Hb level followed by moderately anemic girls followed by mildly anemic girls. It is observed that lower the initial Hb level ,the greater the increase on supplementation. It is the fact that the body dictates the amount of iron to be absorbed depending on its own iron intake.

Knowledge about anemia and its prevention is as important as IFA prophylaxis /treatment for the maintenance of anemic free status.

Three questions were chosen for statistical analysis on the KAP about anemia.

Table 10 shows that regarding the question what is anemia

- Initially only 36 girls were able to answer correctly.
- 301 were able to tell after counseling
- 35 still could not answer correctly

Table -11 shows that regarding the question about causes of anemia

- Initially only 31 girls were able to answer correctly
- 299 girls were able to tell after counseling
- 31 girls could not answer even after counseling.

Table- 12 shows ,regarding the question about iron rich foods

- only 69 girls answered correctly prior to counseling
- 301 girls answered after counseling
- 35 girls were unable to answer even after counseling

The gain in knowledge about these questions among these adolescent girls is statistically significant. p value-0.000

Those who were not able to answer even after counseling belong to 12-15 years of age group and their inability may be due to their lower

perception and probably these counseling sessions were not tailored to meet their standards.

A community based randomised behavioral and dietary iron intervention trial by pre and post counseling questionnaire was conducted by Hillary et al. to improve dietary iron intake and bio- availability of adolescent girls living in periurban area of Lima, Peru .

Results showed that there was a change in knowledge and perception about anemia and improved dietary iron intake in the 71 girls who completed the study compared with 66 girls in the control group .Although this 9 months intervention study was not sufficient to improve Hb levels significantly, it helped in maintaining the iron status of girls in comparison with control groups.

SUMMARY

SUMMARY

This study conducted at ISO-KGH , Chennai is to screen the adolescent girls in lower socioeconomic status for anemia. Among 500 girls screened, 340(68%) were found to be anemic under various degrees.

All the girls showed significant improvement in Hb levels and reached normal level after IFA supplementation and deworming. Severely anemic girls needed a longer time of IFA supplementation.

In this study, lower socioeconomic status, hookworm infestation , increasing age were found to be attributable causes of anemia.

There is significant improvement in the knowledge about anemia after counseling.

CONCLUSION

CONCLUSION

Adolescence is an oppurtune time for interventions to address anemia. In addition to growth needs, girls need to improve iron status before pregnancy. Preventing iron deficiency and increasing iron stores in adolescent girls can improve their iron status in preparation for pregnancy and benefit their current health and well being .Treating anemia in adolescent girls is a primordial prevention there by reducing anemia complicating pregnancies and hence maternal mortality and morbidity to a great extent.This study shows the prevalence of anemia in adolescent girls in lower socioeconomic strata.Hence there is an urgent need to improve their iron status by planning intervention programme that would increase the hemoglobin levels through prophylaxis treatment, dietary modification and helminthic control .

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BIBLIOGRAPHY

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PROFORMA

PROFORMA

NAME

AGE

SOCIOECONOMIC STATUS; - INCOME

- EDUCATION

MENSTRUAL HISTORY;

DIET HISTORY;

CLINICAL EXAMINATION;

SIGNS OF PALLOR, EDEMA ,CVS, RS.

INVESTIGATIONS; HEMOGLOBIN ESTIMATION

STOOL EXAMINATION

QUESTIONNAIRE;

1) WHAT IS ANEMIA?
2) WHAT ARE THE CAUSES OF ANEMIA?
3) KNOWLEDGE ABOUT IRON RICH FOODS?

ABBREVIATIONS

Hb	Hemoglobin
IFA	Iron and folic acid
AGS	Adolescents Girls Scheme
ICDS	Integrated Child Development Scheme
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organisation
IHMP	Institute of Health Management- Pachod
ICRW	International Center for Research on women

MASTER CHART

MASTER CHART

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
1	Abirami	15	4	NO	10.3	12.1	12.2	12.4	12.6	NO	NO	NO	NO	YES	YES
2	Aftaf begum	17			12.1										
3	Ajantha	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
4	Ajantha	17	4	NO	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
5	Akila	16			12.4										
6	Akshaya	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
7	Alli	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
8	Alli	12			12.2										
9	Amala	19	5	YES	7.5	8.5	9.6	11.1	12.5	NO	NO	NO	NO	NO	NO
10	Ambika	18	4	N0	10.1	11.3	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
11	Amitha	19	5	YES	7.5	8.5	9.6	11.1	12.5	NO	NO	NO	NO	NO	NO
12	Amuda	16	4	NO	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
13	Amudha	19	4	NO	10.2	12	12.2	12.4	12.6	YES	YES	YES	YES	YES	YES
14	Anitha	18	5	YES	8.9	11.1	NFW			NO	NO	YES	YES	YES	YES
15	Anjali	16	4	NO	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
16	Anjali	14			12.2										
17	Anjana	16	4	NO	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
18	Anjana	13			12.2										
19	Anjana	17			12.1										
20	Anuja	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
21	Anupama	15			12.1										
22	Anuradha	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
23	Anuradha	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
24	Anuradha	16			12.2										
25	Anurekha	17			12.0										
26	Anushya	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
27	Anushya	19			12.1										
28	Aparna	15			12.1										
29	Apoorva	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
30	Aradana	18	5	YES	7.8	10.8	12.9	13	13.1	NO	NO	NO	YES	YES	YES
31	Aradana	19			12.2										
32	Aradhana	14			12.0										
33	Arasi	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
34	arasi	18	4	N0	10.1	11.3	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
35	Arasi	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
36	Aravani	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
37	Archana	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
38	arika	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
39	Arokiyam	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
40	Arumbu	12			12.0										
41	Aruna	18	5	YES	9	12.0	12.2	12.5	12.7	NO	NO	NO	NO	NO	NO
42	Aruna	16			12.2										
43	Asha	18	5	YES	7.8	8.8	9.8	10.8	12	YES	YES	YES	YES	YES	YES
44	Asha	19	5	YES	9	12.1	12.4	12.6	12.8	YES	NO	YES	YES	YES	YES
45	Asina begum	16	4	YES	9	12.0	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
46	Asinabegum	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
47	Asinabegum	19	5	YES	8.9	10.9	NFW			NO	NO	NO	YES	YES	YES
48	Baby	16	4	NO	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
49	Baby	15			12.1										
50	Bagavathi	16	4	NO	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	NO	NO	NO
51	Bagavathi	19			12.1										
52	Bala	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
53	Banu	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
54	Barani	19			12.1										
55	Bargath nisha	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
56	Bargathnisha	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
57	Bavana	17	5	YES	8.9	11.0	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
58	Bavana	19	5	YES	9	12.1	12.4	12.6	12.8	YES	NO	YES	YES	YES	YES
59	Bavana	18	4	N0	10.3	12.2	12.4	12.6	12.7	NO	NO	NO	YES	YES	YES
60	Bavana	15			12.2										
61	Bavana	19			12.3										
62	Bavani	16	4	NO	10.1	12.1	12.3	12.5	12.6	NO	NO	NO	NO	NO	NO
63	Benazir	15			12.1										
64	Bhagavi	19			12.1										
65	Bindu	18	5	YES	9	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
66	Bindu	17	4	YES	9.1	11.0	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
67	Booma	18	5	YES	8.9	10.1	11.1	12.3	12.6	NO	NO	YES	YES	YES	YES
68	Carulatha	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
69	Celin	14			12.2										
70	Charulatha	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
71	Chithra	18	5	YES	9.0	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
72	Clara	19	5	YES	8.9	12.1	12.3	12.6	12.7	NO	NO	NO	YES	YES	YES
73	Danya	14			12.1										

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
74	Deepa	15	4	NO	10.4	12.1	12.3	12.5	12.6	NO	NO	NO	NO	NO	NO
75	Deepa	19	5	YES	9.0	10.3	11.3	12.3	12.5	NO	NO	YES	YES	YES	YES
76	Deepa	19			12.1										
77	Devi	18	5	YES	9.0	11.0	12	12.2	12.5	NO	NO	YES	YES	YES	YES
78	Devi	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
79	devi	14	4	NO	10.4	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
80	Devi	19			12.1										
81	Devika	18			12.1										
82	Devipriya	18	4	N0	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
83	Devipriya	16	4	NO	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
84	Devipriya	19			12.2										
85	Devishree	14			12.1										
86	Dhanam	17	5	YES	8.9	11.0	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
87	Dharani	14			12.1										
88	Dhivya	12			12.0										
89	Divya	17	5	YES	8.9	10.0	11	12.2	12.5	NO	NO	NO	YES	YES	YES
90	Durga	18	5	YES	7.8	8.8	9.8	10.8	12.1	YES	YES	YES	YES	YES	YES
91	Durga	18	5	YES	9.0	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
92	Elavarsi	19	5	YES	9.0	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
93	Eswari	14			12.2										
94	Ezhil Arasi	18	5	YES	9.0	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
95	Famidha	15			12.o										
96	Famrose	16	4	YES	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
97	Farida	15	4	NO	10.4	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
98	Farzana	18	5	YES	9.0	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
99	Gayathri	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
100	Gayatri	15			12.1										
101	Geetha	14	4	NO	10.5	12.0	12.2	12.4	12.6	NO	NO	NO	NO	NO	NO
102	Geetha	13			12.2										
103	Geethadevi	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
104	Geetheprasad	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
105	Girija	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
106	Gita	17	5	YES	8.9	11	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
107	Gitanjali	15			12.1										
108	Gitanjali	19			12.2										
109	Gopika	15			12.1										
110	Gousiya	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
111	govindammal	18	4	N0	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
112	Gowri	17			12.3										
113	Gowthami	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
114	Gunasundari	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
115	Hamedha	15			12.3										
116	Hassena	17	5	YES	8.9	10	11	12.2	12.5	NO	NO	NO	YES	YES	YES
117	Hazeena	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
118	Hemalatha	16			12.0										
119	Hemavathy	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
120	Hemavathy	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
121	Ilavarasi	16			12.1										
122	Indrani	13			12.0										
123	Indu	16			12.3										
124	Indumathi	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
125	Iniya	13			12.1										
126	Iri	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
127	Ishwarya	19			12.0										
128	Jameela	18	5	YES	9	11.0	12	12.2	12.5	NO	NO	YES	YES	YES	YES
129	Jamuna	12			12.1										
130	Janani	16	4	YES	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
131	Janani	19			12.o										
132	Janavi	14			12.o										
133	Jansi	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
134	Jaya	15			12.2										
135	Jenifer	18			12.1										
136	Jerlin	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
137	Jerlin	17	5	YES	8.9	11.0	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
138	Jeyam	19			12.2										
139	Jeyanirmala	15			12.1										
140	Jothi	16	4	YES	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
141	Jothi	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
142	Jothi	18			12.2										
143	Jothika	17	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	YES	YES	YES
144	Jothika	18			12.1										
145	Kala	16	4	YES	9	12.0	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
146	Kala	19	5	YES	7.6	10.7	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
147	Kalai	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
148	Kalaimani	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
149	Kalaimani	17	4	NO	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
150	Kalaipriya	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
151	Kalanjiyam	19			12.0										
152	Kaliamma	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
153	Kalyani	19	5	YES	8.9	10.9	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
154	Kalyani	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
155	Kalyani	19	5	YES	7.5	8.6	9.6	11.1	12.6	NO	NO	NO	NO	NO	NO
156	Kamala	19	5	YES	7.6	10.6	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
157	Kamali	19			12.1										
158	Kamini	18			9.1	NFW									
159	Kanageswari	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
160	kanchana	19	5	YES	8.9	10.9	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
161	Kanees	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
162	Kaniga	17	4	NO	10.1	11.3	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
163	Kaniga	14			12.1										
164	Kanimozhi	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
165	Kanimozhi	19	5	YES	7.7	8.7	9.6	11.1	12.6	NO	NO	NO	NO	NO	NO
166	Kannagi	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
167	Karima	19	4	NO	10.3	12	12.2	12.4	12.6	YES	YES	YES	YES	YES	YES
168	Karima	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	YES	YES	YES	YES
169	Karthika	12			12.1										
170	Kasthuri	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
171	Kavitha	16	4	YES	9	12.0	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
172	Kavitha	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
173	Kavitha	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
174	Kavya	19			12.o										
175	Kayalvihi	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
176	Kayalvizhi	15			12.2										
177	Keeravani	18			9.2	NFW									
178	Keerthana	19			12.1										
179	Kiruba	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
180	Kokilavani	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
181	Konshika	18			9.1	NFW									
182	Koohini	18	5	YES	8.9	10.1	11.1	12.3	12.6	NO	NO	YES	YES	YES	YES
183	Koohini	17			12.2										
184	Kousika	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
185	Kumari	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
186	Kupammal	19			12.1										
187	Kuttiyamma	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
188	Lalitha	19	5	YES	7.5	8.6	9.6	11.1	12.5	NO	NO	NO	NO	NO	NO
189	Lalitha	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
190	Latha	16	4	YES	9	12.0	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
191	Lavanya	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
192	Lavanya	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
193	Laxmi	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
194	Laxmi	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
195	Laxmi	14			12.0										
196	Laxmi Devi	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
197	Leela	18			12.4										
198	Leena	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
199	Lovy	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
200	Lubiana	17	5	YES	8.9	10	11	12.2	12.5	NO	NO	NO	YES	YES	YES
201	Madhavi	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
202	Madhini	19			12.1										
203	Madhupriya	19	5	YES	7.6	9.1	10.5	12	12.4	NO	NO	NO	YES	YES	YES
204	Madhuri	19			12.1										
205	Madupriya	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
206	Madura	17	4	NO	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
207	Magi	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
208	Mahalakshmi	19	5	YES	9.0	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
209	Maharani	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
210	Maheshwari	17	5	YES	8.9	11.0	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
211	Maheswari	15	4	NO	10.4	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
212	Maheswari	14			12.1										
213	Mala	19	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	YES	YES	YES
214	Mala	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
215	Malathi	16	4	NO	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	NO	NO	NO
216	malathy	14	4	NO	10.6	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
217	Malavika	16	4	YES	9.0	12.0	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
218	Malini	19			12.1										
219	Mangai	18	5	YES	7.8	9.3	10.8	12.2	12.4	NO	NO	NO	YES	YES	YES
220	Manimgalai	18			12.1										
221	Mariamma	17	5	YES	8.9	11.0	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
222	Mariyamma	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
223	Mary	17	5	YES	8.9	10.0	11	12.2	12.5	NO	NO	NO	YES	YES	YES
224	Meena	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
225	Meena	19			12.1										

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
226	Meenakumari	18	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	NO	NO	NO
227	Meenakumari	15	4	NO	10.4	12.1	12.3	12.4	12.6	NO	NO	NO	NO	NO	NO
228	Meenkshi	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
229	Meera	19			12.2										
230	Menaka	17	5	YES	8.9	11	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
231	Menaka	14			12.1										
232	Midhuna	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
233	Midhuna	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
234	Mini	19			12.1										
235	mohana	13	4	NO	10.3	12	12.2	12.4	12.6	NO	NO	NO	NO	NO	NO
236	Mohana	15			12.1										
237	Mohini	19	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	YES	YES	YES
238	Monisha	14			12.1										
239	Mounika	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
240	Mounika	14			12.1										
241	Mullai	19	5	YES	8.9	10.3	11.3	12.3	12.7	NO	NO	NO	YES	YES	YES
242	Mullai	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
243	Muniyammal	19			12.2										
244	Munulakshmi	16			12.3										
245	Murugamma	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
246	Murugamma	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
247	Murugathai	19	4	NO	10.3	12	12.2	12.4	12.6	YES	YES	YES	YES	YES	YES
248	Muthiyalu	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
249	Mythili	15	4	NO	10.3	12.1	12.2	12.4	12.6	YES	YES	YES	YES	YES	YES
250	Mythili	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
251	Nagma	18			12.1										
252	Nagmma	18	4	N0	10.1	11.3	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
253	Nalina	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
254	Nameeda	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
255	Nameedha	15			12.1										
256	Nancy	18	5	YES	9.0	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
257	Nandhini	16	4	YES	9.1	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
258	Nandhini	13			12.2										
259	Nandini	19			12.1										
260	Narayani	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
261	Narmada	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
262	Narmada	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
263	Narmadha	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
264	Narmadha	15			12.2										
265	Nathiya	19	5	YES	8.9	10.9	NFW			NO	NO	NO	YES	YES	YES
266	Nathiya	19	5	YES	7.5	8.6	9.6	11.1	NFW	NO	NO	NO	NO	NO	NO
267	Nazima	19	5	YES	7.6	8.6	9.6	11	12.5	NO	NO	NO	YES	YES	YES
268	Neela	19	5	YES	7.7	9.1	10.6	12	12.3	NO	NO	NO	YES	YES	YES
269	Neela	15	4	NO	10.3	12.1	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
270	Neelambaru	13			12.1										
271	Neelaveni	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
272	Neena	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
273	Neeraja	19	5	YES	7.5	9	10.5	12	12.4	NO	NO	NO	YES	YES	YES
274	Neeraja	17	4	NO	10.1	11.3	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
275	Neha	19	5	YES	7.7	8.6	9.6	11	12.5	NO	NO	NO	YES	YES	YES
276	Nemma Rose	18	4	N0	10.3	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
277	Nethra	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
278	Nimmi	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
279	Niranjana	18	5	YES	9	11	12	12.2	12.5	NO	NO	YES	YES	YES	YES
280	Niranjana	13			12.2										
281	Nirmala	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
282	Nirmala	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
283	Nirosha	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
284	Nirosha	19			12.1										
285	Nisha	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
286	Nithya	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
287	Nithya	17			12.1										
288	Noorien	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
289	Padma	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
290	Padma	15			12.1										
291	Pameela	17			12.1										
292	Parimala	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
293	Parimala	18			12.2										
294	Parvathi	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
295	Parvathi	19	5	YES	8.9	10.3	11.3	12.3	12.7	NO	NO	NO	YES	YES	YES
296	Parveen	19	5	YES	9.0	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
297	Pavithra	17	4	YES	9.1	11	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
298	Ponvadivu	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
299	Pooja	19	5	YES	8.9	10.3	11.3	12.3	12.7	NO	NO	NO	YES	YES	YES
300	Poorvika	16	4	YES	9.0	11	12	12.3	12.5	NO	NO	NO	YES	YES	YES
301	Prabavathy	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
302	Prasanthi	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
303	Preethi	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
304	Premalatha	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
305	Premalatha	15			12.2										
306	Premila	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
307	Priya	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
308	Priya	15			12.2										
309	Priyanka	16	4	NO	10.1	12.1	12.2	12.5	12.6	YES	YES	YES	YES	YES	YES
310	Punitha	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
311	punitha	16	4	YES	9.0	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
312	Punitha	16			12.2										
313	Radabai	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
314	radha	18	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	NO	NO	NO
315	Radha	16	5	YES	7.9	10.9	12.9	13	13.1	NO	NO	NO	YES	YES	YES
316	radha	13	4	NO	10.6	12.1	12.3	12.4	12.5	NO	NO	NO	NO	NO	NO
317	Radha	19			12.1										
318	Radhabai	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
319	Radhika	18			12.1										
320	Radhika	19			12.1										
321	Radhika	19			12.1										
322	Radika	19			12.2										
323	Ragam	19	5	YES	7.7	10.7	12.2	12.3	12.5	NO	NO	NO	YES	YES	YES
324	Ragasya	12			12.1										
325	Ragavi	18	5	YES	8.9	11.1	NFW			NO	NO	YES	YES	YES	YES
326	Ragavi	14			12.1										
327	Ragini	18	5	YES	9.0	10	11.1	12.3	12.5	YES	NO	NO	YES	YES	YES
328	Rajamaheswari	18			12.3										
329	Rajeswari	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
330	Raji	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
331	Raji	18			12.3										
332	Rama	19	4	NO	10.4	12.1	12.3	12.5	12.7	YES	YES	YES	YES	YES	YES
333	Ramani	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
334	Ramani	17			12.1										
335	Ramayee	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
336	Ramya	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
337	Ramya	13			12.1										
338	Rani	17	5	YES	8.9	10	11	12.2	12.5	NO	NO	NO	YES	YES	YES
339	Rani	18	5	YES	7.8	8.8	9.8	10.8	12	YES	NO	YES	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
340	Ranjani	12			12.0										
341	Ravali	18			9.1	NFW									
342	Reena	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
343	Rekha	18			12.3										
344	Renuga	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
345	Renuka	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
346	Renuka	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
347	Revathy	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	NO	NO	NO
348	Rohini	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
349	Roopadevi	18	5	YES	7.8	8.8	9.8	10.8	12.1	YES	NO	NO	YES	YES	YES
350	Roshini	19			12.1										
351	Ruckmani	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
352	sabnam	17	4	NO	10.3	12.2	12.4	12.5	12.7	NO	NO	NO	YES	YES	YES
353	Sahana	19			12.1										
354	Sahin	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
355	Salima	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
356	Sanath banu	17	4	NO	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
357	Sangavai	17			12.2										
358	Sangavi	18	4	NO	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
359	Sangavi	19			12.2										
360	Sangeetha	16	4	NO	10.3	12.2	12.4	12.6	12.8	NO	NO	NO	NO	NO	NO
361	Sangeetha	17			12.1										
362	Santhosi	18	5	YES	8.9	10.1	11.1	12.3	12.6	YES	NO	YES	YES	YES	YES
363	Sapna	19	5	YES	7.5	9	10.5	12	12.5	NO	NO	NO	YES	YES	YES
364	Sapna	14			12.0										
365	sarala	12	4	NO	10.3	12	12.2	12.4	12.6	NO	NO	NO	NO	NO	NO
366	Sarala	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
367	Sarala	15			12.1										
368	Saranya	19	5	YES	7.6	8.5	9.5	11	12.5	NO	NO	NO	YES	YES	YES
369	saraswathi	12	4	NO	10.6	12.1	12.3	12.5	12.7	NO	NO	NO	NO	NO	NO
370	Sarika	19	5	YES	7.7	8.7	9.6	11.1	12.6	NO	NO	NO	YES	YES	YES
371	Saritha	19	5	YES	9.0	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
372	Saritha	16			12.2										
373	Sarumathy	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
374	Sathya	19	5	YES	7.6	9.1	10.5	12	12.3	NO	NO	NO	YES	YES	YES
375	Savitha	19	5	YES	7.7	9.1	10.6	12	12.4	NO	NO	NO	YES	YES	YES
376	Savithri	18			12.2										
377	Seetha	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
378	Seetha	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
379	Seetha	18			12.1										
380	Sekari	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
381	Selva	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
382	Selvi	17			12.1										
383	Shabnam	15			12.1										
384	Shajitha	19	5	YES	9.0	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
385	Shalini	19	5	YES	7.6	8.6	9.6	11	12.5	NO	NO	NO	YES	YES	YES
386	Shalini	19	5	YES	7.7	8.6	9.6	11.1	12.6	NO	NO	NO	YES	YES	YES
387	Shalini	19			12.1										
388	Shanaz begum	17			12.1										
389	Shanmugapriya	19	5	YES	9.0	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
390	Shanmugi	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
391	Shanmugi	14			12.1										
392	Shantha	16			12.2										
393	Shanthamma	17	4	YES	9.1	12.0	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
394	Shanthi	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
395	Sheen	18	5	YES	8.9	10.1	11.1	12.3	12.6	NO	NO	YES	YES	YES	YES
396	Sherin	19			12.0										
397	Shirley	19	5	YES	7.6	8.6	9.6	11	12.5	NO	NO	NO	YES	YES	YES
398	Shirley	13			12.1										
399	Shobaba	19			12.3										
400	Shreya	15			12.1										
401	Shrin	17	5	YES	7.8	10.9	13	13.1	13.2	NO	NO	NO	YES	YES	YES
402	Simran	18			12.0										
403	Sindhuja	19	5	YES	9	12.1	12.4	12.6	12.8	NO	NO	YES	YES	YES	YES
404	Sindhuja	13			12.1										
405	Sindu	16	4	NO	10.3	12.2	12.4	12.6	12.8	NO	NO	NO	NO	NO	NO
406	Sinduja	19			12.3										
407	Soiya	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
408	Soniya	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
409	Soniya	17	4	NO	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
410	Soniya	13			12.0										
411	Soorya	17	4	NO	10.3	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
412	Soundarya	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
413	Sowmiya	19			12.1										
414	Sridevi	17			12.2										
415	Srilekha	12			12.1										

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
416	Srripriya	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
417	Subbu	19	4	NO	10.2	12	12.2	12.4	12.6	YES	YES	YES	YES	YES	YES
418	Subha	19	4	NO	10.4	12.1	12.3	12.5	12.7	YES	YES	YES	YES	YES	YES
419	Sudha	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
420	Sudha	18	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
421	Sudha	19			12.1										
422	Suganthi	19	5	YES	7.7	10.8	12.2	12.3	12.5	NO	NO	NO	YES	YES	YES
423	Suganya	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
424	Suganya	15			12.2										
425	Sugumari	15			12.3										
426	Suguna	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
427	Suguna	15			12.1										
428	Sujatha	19			12.1										
429	Sulochana	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	YES	YES	YES	YES
430	Sulochana	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
431	Sulochana	17	5	YES	8.9	11	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
432	Sulochana	15			12.2										
433	Sulthana	19	5	YES	9.0	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
434	Sumathy	15			12.3										
435	Sumithra	18	5	YES	8.9	10.1	11.1	12.3	12.6	NO	NO	YES	YES	YES	YES
436	Sumithra	15			12.1										
437	Sundari	18	5	YES	7.8	9.3	10.8	12.3	12.5	NO	NO	NO	YES	YES	YES
438	Surya	19	5	YES	9.0	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
439	Surya	18			12.1										
440	Swetha	12			12.1										
441	Tamil	19	5	YES	9.0	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
442	Tamil	14	4	NO	10.3	12	12.2	12.4	12.6	NO	NO	NO	NO	NO	NO
443	Tamil	19			12.2										
444	Tamilarasi	17	4	NO	10.3	12.2	12.4	12.5	12.7	NO	NO	NO	YES	YES	YES
445	Tamilmani	16	4	NO	10.3	12.2	12.4	12.5	12.6	NO	NO	NO	NO	NO	NO
446	Tamilselvi	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
447	Tamilvani	16			13.0										
448	Tasleem	16	4	NO	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
449	Tasleem	15			12.1										
450	Thamarai	19	5	YES	9.1	10.3	11.3	12.3	12.6	NO	NO	NO	YES	YES	YES
451	thangam	19			12.1										
452	Thenmozhi	16	4	YES	9.1	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
453	Therasa	17			12.1										

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
454	Thrisha	19			12.2										
455	Thurothamma	14	4	NO	10.6	12.1	12.3	12.5	12.6	NO	NO	NO	NO	NO	NO
456	Tulasi	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
457	Udaya	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
458	Uma	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
459	Umadevi	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
460	Umamaheshwari	18	4	N0	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
461	Umarani	18			12.0										
462	Vaishnavi	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
463	Valarmathy	16			12.2										
464	vanitha	19	5	YES	9.1	10.9	12	12.2	12.4	NO	NO	NO	YES	YES	YES
465	Vanitha	17	5	YES	8.9	11	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
466	Vanmathy	18	5	YES	8.9	11.1	12.2	12.4	12.6	NO	NO	YES	YES	YES	YES
467	Vanmathy	14			12.2										
468	Vasantha	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
469	Vasanthi	17	4	YES	9.1	12	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
470	Vasanthy	16			12.1										
471	Vasumathi	14			12.0										
472	Veena	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
473	veerama	18	5	YES	9	12	12.2	12.5	12.7	NO	NO	NO	NO	NO	NO
474	Vetriselvi	17	5	YES	8.9	12.2	12.4	12.6	12.8	NO	NO	NO	YES	YES	YES
475	Vidhya	19			12.1										
476	Vidya	17	5	YES	8.9	11	12.1	12.4	12.7	NO	NO	NO	YES	YES	YES
477	Vijaya	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
478	Vijayam	19	5	YES	9.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
479	Vimala	19	5	YES	8.9	10.9	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
480	Vimala	15			12.1										
481	Vinitha	18	4	N0	10.2	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
482	Vinitha	19	5	YES	8.9	9.4	9.9	TF		NO	NO	NO	YES	YES	YES
483	Vinoda	18	5	YES	9	12.0	12.2	12.5	12.7	NO	NO	NO	YES	YES	YES
484	Vinodha	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	YES	YES	YES	YES
485	Vinodha	17			12.2										
486	Vinodhini	19	5	YES	8.9	10.3	11.3	12.3	12.7	NO	NO	NO	YES	YES	YES
487	Vinodini	16	4	YES	9	12	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES
488	Vinudha	18	5	YES	7.8	8.8	9.8	10.8	12	YES	YES	YES	YES	YES	YES
489	Vinupriya	19	5	YES	9	10.3	11.3	12.3	12.5	NO	NO	NO	YES	YES	YES
490	Vishali	18	5	YES	7.8	9.2	10.7	12.2	12.5	NO	NO	NO	YES	YES	YES
491	Vishnupriya	19	5	YES	8.9	10.9	12.2	12.4	12.6	NO	NO	NO	YES	YES	YES

Sl.No	NAME	AGE	SES	H/WORM	INITIALHb	3M-Hb	6M-HB	9M-HB	12M-HB	1- PRE	2- PRE	3-PRE	1-POST	2 -POST	3-POST
492	Waheedha	18			12.1										
493	Wahida banu	18	5	YES	7.8	9.3	10.7	12.2	12.4	NO	NO	NO	YES	YES	YES
494	Wahida banu	18	5	YES	9	11	12	12.2	12.5	NO	NO	YES	YES	YES	YES
495	Wahida banu	18	4	N0	10.1	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
496	Yamini	19	5	YES	7.5	8	8.5	TF		NO	NO	NO	NO	NO	NO
497	Yamuna	19	5	YES	8.9	12.1	12.3	12.5	12.7	NO	NO	NO	YES	YES	YES
498	Yashodha	19	5	YES	9	12.1	12.4	12.6	12.8	YES	YES	YES	YES	YES	YES
499	Yashodharani	19	5	YES	9	10.9	12.1	12.3	12.5	NO	NO	NO	YES	YES	YES
500	Yasodarani	15	4	NO	10.4	12.1	12.4	12.5	12.7	NO	NO	NO	NO	NO	NO

SES	Socio Economic Status
H/WORM	Hookworm injfestation
M	Month
HB	Hemoglobin
PRE	Pre Counseling
POST	Post Counseling
NFW	No followup
TF	Treatment Failure